Trend Study 16A-8-97

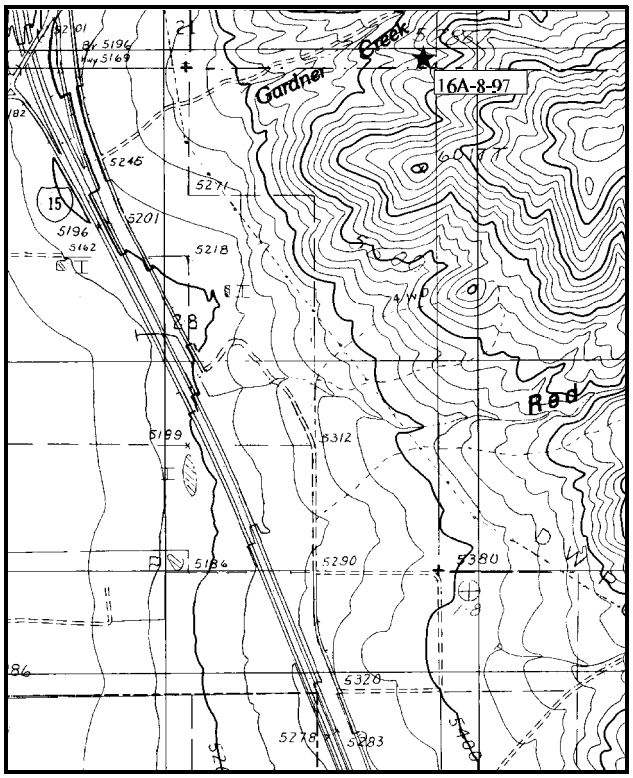
Study site name: Gardner Canyon . Range type: Stansbury Cliffrose

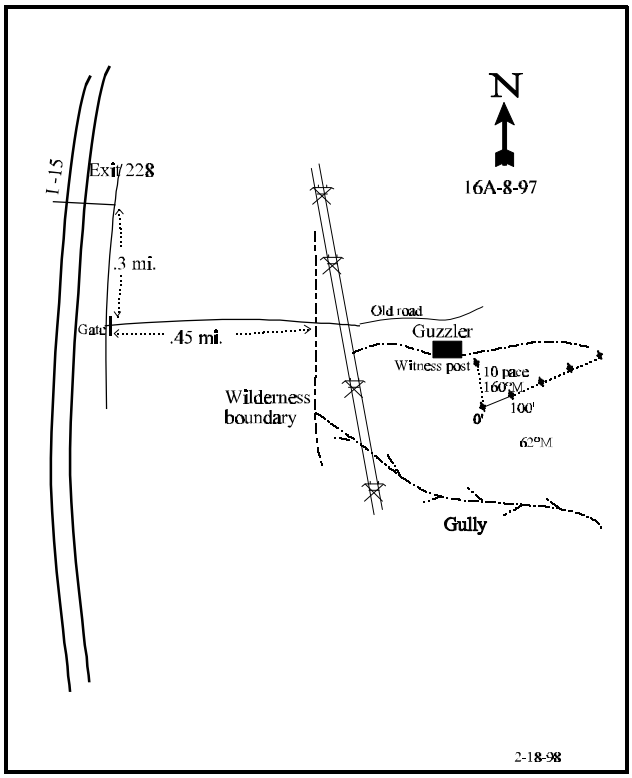
Compass bearing: frequency baseline 62 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From I-15 exit # 228 turn south on the frontage road and drive 0.3 miles to an intersection with a gate. Turn left at the intersection and drive 0.45 miles to the wilderness boundary fence. Walk up the old road under some powerlines. To the south, perpendicular to the road, is a steep slope characterized by Gambel oak and cliffrose. Walk up the slope to a guzzler on the ridgetop. At the southeastern corner of the guzzler there is a witness post. The 0-foot stake is 10 paces at an azimuth of 160°M. The study is marked by green steel "T" fenceposts 12 to 13 inches in height and the 0-foot stake has a red browse tag, number 3964, attached.





Map Name: Nephi, Utah . Diagrammatic Sketch

Township 12 S , Range 1 E , Section 28 UTM 4399995.648 N, 429817.960 E

DISCUSSION

Trend Study No. 16A-8 (25-8)

The Gardner Canyon study is one of four located on critical winter range along the west Nebo face. This narrow band of habitat lying between Interstate 15 and the approximately 6,000 foot elevational contour is critically important. The study is on Division land near the guzzler in Gardner Canyon. The study samples a 45% to 50% south facing slope. The foothills between the site and I-15 are heavily used by deer and elk and many deer carcasses were found in the area during the 1989 reading. Deer and elk pellet groups are currently moderately abundant with similar frequencies of 20% and 22% respectively.

Soil at the site is exceptionally rocky and well-drained. Parent material is limestone with an abundance of large and small rock on the surface. Effective rooting depth (see methods) is estimated at only 10 inches. Texture is a loam with a neutral pH of 7.0. Organic matter is limited at only 1.6% and phosphorus, like site #7, may be a limiting factor to plant growth at only 4.4 ppm, where a minimum of 10 ppm is believed necessary for normal plant development. Percent bare ground was excessive in 1983 at 30%; however, percent bare soil declined to 18% by 1997. Rock and pavement cover is abundant. Although erosion is localized and soil pedestalling evident, erosion does not appear to be serious due to the abundant rock and annual grass cover.

The dominant browse on the site consist of large Stansbury cliffrose and true mountain mahogany. Cliffrose produces 54% of the browse cover with a density of 600 plants/acre in 1997. The decline in density from 966 plants/acre in 1989 is partly due to the much larger sample size used in 1997. Average height of mature plants is currently just under 4 feet, making most plants still available for wildlife use. Use has been consistently heavy since 1983. Currently, 80% of the plants sampled are heavily hedged. Most plants display normal vigor with percent decadence estimated at 23%.

True mountain mahogany occurs in small numbers (200 plants/acre) and is also heavily utilized. The larger sample size used in 1997 is responsible for the change in density between 1989 and 1997(466 to 240). The larger sample size gives better estimates for shrub populations that are discontinuous or clumped in their respective distributions. Recruitment is poor and currently 83% of the population consists of mature plants. Decadency has remained low since 1983. Heavy use has increased with each successive reading from 30% in 1983 to 64% in 1989, and 75% in 1997. Vigor has remained normal. Other preferred browse are limited. Undesirable shrubs include narrowleaf low rabbitbrush and broom snakeweed.

Grass and forb composition is dominated by annuals, biennials, and low-value perennials. Cheatgrass produces 60% of the grass cover and constitutes a severe fire hazard to the key browse species, especially the cliffrose which do not resprout after fire. The only perennial grass encountered is bluebunch wheatgrass which makes up the other 40% of the grass cover. Perennial forbs are rare.

1983 APPARENT TREND ASSESSMENT

Soil condition, as elsewhere on the Nebo face, is a definite limiting factor. The ongoing erosion and competition with the annual herbaceous species makes seedling establishment of desirable plants very difficult. Soil trend must be judged down. Vegetative trend also appears down. The key browse species, Stansbury cliffrose, is not adequately reproducing, nor are the important secondary shrubs. Broom snakeweed, cheatgrass brome, and annual forbs comprise far too great a proportion of the total vegetative composition. Wildlife use continues to be heavy with little prospect for range improvements in the future.

1989 TREND ASSESSMENT

Differences in the percentages of vegetative and litter cover are largely related to changes in the prevalence of cheatgrass between years. It was much less abundant in the dry season of 1983. The ground cover data shows significantly more pavement and rock cover in 1989, indicating continued loss of surface soil. Soil trend is considered stable, but in poor condition. The density of the key browse species, cliffrose, is unchanged. However, there were some changes in the age class structure of the population. A few young cliffrose were classified in 1989, but 51% of the population was considered decadent compared to 20% in 1983. The majority of the cliffrose remain severely hedged and generally vigor is only fair. The true mountain mahogany are also heavily hedged. Most of the junipers on the site have an obvious high-line. The few sagebrush sampled are decadent and in poor vigor. The drop in total browse density is due mainly to a decline of broom snakeweed. Browse trend is considered down slightly. There is a low frequency of perennial grasses and forbs. The only perennial grass species encountered in 1989 was bluebunch wheatgrass. The only perennial forbs with any significance are scarlet globemallow and low fleabane. Fewer species were identified in 1989. Trend for the herbaceous understory is stable, but in poor condition.

TREND ASSESSMENT
soil - stable and continued poor condition
browse - down slightly for cliffrose and mahogany
herbaceous understory - stable, but in poor condition

1997 TREND ASSESSMENT

Soil conditions are still poor on the site, however, protective ground cover has increased since 1989. Trend is considered slightly up for soils. Trend for the key browse species, cliffrose and mahogany, is stable. Cliffrose is heavily hedged, although vigor has improved and percent decadency has declined from 51% in 1989 to 23%. Mahogany is also heavily utilized, but vigor is normal and decadency low at only 8%. Trend for the herbaceous understory is stable yet depleted because of the large proportion of annual weeds in the understory. The understory of annuals is a severe fire hazard to the non-sprouting browse species.

TREND ASSESSMENT
soil - up slightly
browse - stable for cliffrose and mahogany
herbaceous understory - stable, but depleted

HERBACEOUS TRENDS --
Herd unit 16A , Study no: 8

Type	Species	Nested Frequency '83	'89	'97	Quadrat Frequency '83	'89	'97	Average Cover % '97
G	Agropyron spicatum	234	231	227	93	85	80	7.66
G	Bromus tectorum (a)	-	-	344	-	-	99	11.33
G	Festuca myuros (a)	-	-	3	-	-	1	.00
G	Poa bulbosa	-	-	1	-	-	1	.00
G	Poa pratensis	2	-	-	1	-	-	-
G	Poa secunda	1	-	-	1	-	-	-
Total for Grasses		237	231	575	95	85	181	19.01
F	Alyssum alyssoides (a)	-	-	350	-	-	98	5.48
F	Astragalus spp.	-	2	-	-	1	-	-
F	Calochortus nuttallii	3	-	6	2	-	3	.01
F	Cirsium spp.	1	-	-	1	-	-	-
F	Comandra pallida	3	-	-	1	-	-	-
F	Descurainia pinnata (a)	-	-	6	-	-	3	.01
F	Eriogonum brevicaule	3	-	-	1	-	-	-
F	Erodium cicutarium (a)	-	-	12	-	-	5	.05
F	Erigeron pumilus	$_{b}$14	$_{b}$21	$_{a}$-	5	9	-	-
F	Galium aparine (a)	-	-	2	-	-	1	.03
F	Hackelia patens	-	-	4	-	-	1	.00
F	Hedysarum boreale	$_{b}$17	$_{a}$-	$_{a}$-	9	-	-	-
F	Leucelene ericoides	$_{a}$-	$_{a}$-	$_{b}$15	-	-	6	.27
F	Lygodesmia grandiflora	12	3	5	5	1	2	.03
F	Sphaeralcea coccinea	$_{a}$90	$_{b}$117	$_{a}$80	38	47	35	.50
F	Streptanthus cordatus	8	3	7	3	2	3	.04
F	Tragopogon dubius	4	-	4	2	-	2	.01
F	Trifolium spp.	-	-	1	-	-	1	.00
Total for Forbs		155	146	492	67	60	160	6.46

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16A , Study no: 8

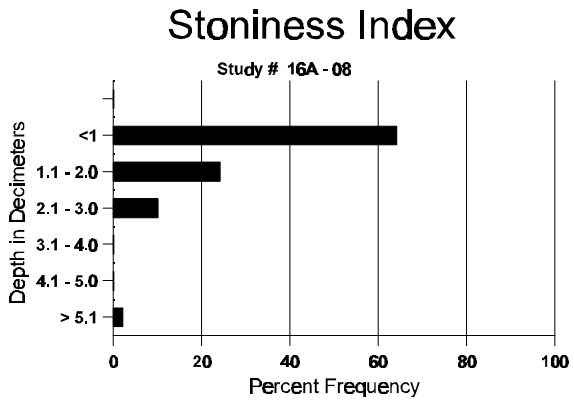
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	1	-
B	Cercocarpus montanus	11	2.78
B	Chrysothamnus nauseosus albicaulis	1	.38
B	Chrysothamnus viscidiflorus stenophyllus	15	.21
B	Cowania mexicana stansburiana	22	4.65
B	Gutierrezia sarothrae	26	.50
Total for Browse		76	8.54

BASIC COVER --
Herd unit 16A , Study no: 8

Cover Type	Nested Frequency '97	Average Cover % '83	'89	'97
Vegetation	380	0	10.25	33.54
Rock	317	17.00	20.00	18.29
Pavement	303	2.00	12.75	7.86
Litter	385	50.50	31.00	30.88
Cryptogams	44	.25	0	.99
Bare Ground	274	30.25	26.00	17.82

SOIL ANALYSIS DATA --
Herd Unit 16A, Study no: 08

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.1	55.4 (13.8)	7.0	38.7	40.7	20.6	1.6	4.4	57.6	.5



PELLET GROUP FREQUENCY --
Herd unit 16A , Study no: 8

Type	Quadrat Frequency '97
Rabbit	5
Elk	20
Deer	21

BROWSE CHARACTERISTICS --
Herd unit 16A , Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
M	83	-	1	1	-	-	-	-	-	-	2	-	-	-	66	25	19	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	35	0
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	1	1	-	-	-	-	-	-	1	-	-	1	66			2
	97	-	2	-	-	-	-	-	-	-	-	-	-	2	40			2
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	50%	50%	00%	+ 0%
'89	50%	50%	50%	-39%
'97	100%	00%	100%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	66	Dec:		0%
'89	66			100%
'97	40			100%

Cercocarpus montanus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	2	1	-	-	-	-	-	-	3	-	-	-	100			3
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	7	3	-	-	-	-	-	-	10	-	-	-	333	52	55	10
	89	-	3	7	-	-	1	-	-	-	11	-	-	-	366	62	51	11
	97	-	2	6	-	1	1	-	-	-	10	-	-	-	200	63	79	10
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	70%	30%	00%	+29%
'89	36%	64%	00%	-48%
'97	25%	75%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'83	333	Dec:	0%
'89	466		0%
'97	240		8%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	28	71	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus stenophyllus																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	18	-	-	-	-	-	-	-	-	18	-	-	-	600	10	13	18
	89	7	6	-	1	-	-	-	-	-	13	-	-	1	466	10	14	14
	97	20	-	-	-	-	-	-	-	-	20	-	-	-	400	13	25	20
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	1	-	-	-	-	-	-	-	1	-	-	1	66			2
	97	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+21%
'89	29%	00%	08%	-45%
'97	00%	00%	05%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	633	Dec:	0%
	'89	798		8%
	'97	440		9%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Cowania mexicana stansburiana																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	3	-	-	2	2	-	-	-	7	-	-	-	233			7
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	-	11	12	-	-	-	-	-	-	23	-	-	-	766	32	30	23
	89	-	2	5	-	-	-	-	-	-	7	-	-	-	233	25	29	7
	97	1	1	15	-	-	3	-	-	-	19	-	-	-	400	46	48	20
D	83	-	-	6	-	-	-	-	-	-	6	-	-	-	200			6
	89	-	2	13	-	-	-	-	-	-	8	-	-	7	500			15
	97	-	-	4	-	-	2	1	-	-	5	-	-	2	140			7
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	180			9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	38%	62%	00%	+ 0%
'89	31%	69%	24%	-38%
'97	03%	80%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	966	Dec:		21%
'89	966			52%
'97	600			23%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	2	-	-	1	60			3
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
M	83	58	-	-	-	-	-	-	-	-	58	-	-	-	1933	11	9	58
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	266	9	8	8
	97	33	-	-	-	-	-	-	-	-	33	-	-	-	660	7	10	33
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	16	-	-	-	-	-	-	-	-	8	-	1	7	533			16
	97	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	-57%
'89	00%	00%	32%	+35%
'97	00%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1933	Dec:	0%
	'89	832		64%
	'97	1280		3%

Quercus gambelii																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	78	81	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	None
'89	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	0		-